

Claims

1. A glass-ceramic comprising a continuous glass phase and a crystal phase, comprising tetragonal leucite, wherein the glass phase is free of cracks and the crystal phase comprising leucite crystals is distributed essentially homogeneously in the glass phase and has the following particle size distribution:
 - from about 5% to about 70% of a first group of crystals having particle sizes of $< 1 \mu\text{m}$ and
 - from about 30% to about 95% of a second group of crystals having particle sizes of $\geq 1 \mu\text{m}$.
2. A glass-ceramic as claimed in claim 1, wherein the proportion of Li_2O in the composition is $< 0.5\%$ by weight.
3. A glass-ceramic as claimed in claim 1 or claim 2, which comprises the following components:
 - from 58% by weight to 75% by weight of SiO_2 ,
 - from 8% by weight to 15% by weight of Al_2O_3 ,
 - from 7% by weight to 15% by weight of K_2O ,
 - from 2% by weight to 12% by weight of Na_2O ,
 - preferably from 2% by weight to 7% by weight of Na_2O or from 9% by weight to 12% by weight of Na_2O ,
 - from 0% by weight to 0.4% by weight of Li_2O ,
 - from 0% by weight to 1% by weight of Sb_2O_3 ,
 - from 0% by weight to 2% by weight of CaO ,
 - from 0% by weight to 2% by weight of F ,
 - from 0% by weight to 2% by weight of B_2O_3 ,
 - from 0% by weight to 1% by weight of CeO_2 ,
 - from 0% by weight to 0.5% by weight of P_2O_5 ,
 - from 0% by weight to 2% by weight of MgO ,
 - from 0% by weight to 2% by weight of BaO .

4. A glass-ceramic as claimed in any of the preceding claims, which comprises $\geq 0.1\%$ by weight of Sb_2O_3 , preferably from 0.1% by weight to 0.5% by weight of Sb_2O_3 .
5. A glass-ceramic as claimed in any of the preceding claims, which comprises $\geq 0.1\%$ by weight of BaO , preferably from 0.1% by weight to 0.5% by weight of BaO .
6. A glass-ceramic as claimed in any of the preceding claims, which comprises from 0% by weight to 1.5% by weight of CaO , preferably from 0.1% by weight to 1% by weight of CaO .
7. A glass-ceramic as claimed in any of the preceding claims, which comprises from 0% by weight of F to 1% by weight of F , in particular from 0.1% by weight to 0.4% by weight of F .
8. A glass-ceramic as claimed in any of the preceding claims, which comprises up to 1.0% by weight of SnO_2 .
9. A glass-ceramic as claimed in any of the preceding claims, which comprises up to 1.0% by weight of TiO_2 .
10. A glass-ceramic as claimed in any of the preceding claims, which comprises up to 1.0% by weight of ZrO_2 .
11. A glass-ceramic as claimed in any of the preceding claims, which comprises the following components:
 - from 60% by weight to 70% by weight of SiO_2 ,
 - from 10% by weight to 15% by weight of Al_2O_3 ,
 - from 10% by weight to 15% by weight of K_2O ,
 - from 2% by weight to 7% by weight of Na_2O ,

- from 0% by weight to 0.3% by weight of Li_2O ,
 - from 0.1% by weight to 0.5% by weight of Sb_2O_3 ,
 - from 0.1% by weight to 0.5% by weight of BaO ,
 - from 0.5% by weight to 1.0% by weight of CaO ,
 - 5 - from 0.1% by weight to 0.4% by weight of F.
12. A glass-ceramic as claimed in any of the preceding claims, which comprises the following components:
- from 63% by weight to 67% by weight of SiO_2 ,
 - 10 - from 12% by weight to 15% by weight of Al_2O_3 ,
 - from 10% by weight to 14% by weight of K_2O ,
 - from 2% by weight to 6.5% by weight of Na_2O ,
 - from 0.1% by weight to 0.2% by weight of Li_2O ,
 - from 0.1% by weight to 0.3% by weight of Sb_2O_3 ,
 - 15 - from 0.1% by weight to 0.3% by weight of BaO ,
 - from 0.6% by weight to 1.0% by weight of CaO ,
 - from 0.1% by weight to 0.3% by weight of F.
13. A glass-ceramic as claimed in any of claims 1 to 10, which comprises the following components:
- from 58% by weight to 65% by weight of SiO_2 ,
 - from 12% by weight to 15% by weight of Al_2O_3 ,
 - from 8% by weight to 12% by weight of K_2O ,
 - from 9% by weight to 12% by weight of Na_2O ,
 - 25 - from 0% by weight to 0.3% by weight of Li_2O ,
 - from 0.1% by weight to 0.3% by weight of CaO ,
 - from 0% by weight to 0.2% by weight of BaO ,
 - from 0.4% by weight to 1.2% by weight of B_2O_3 ,
 - from 0% by weight to 1.0% by weight of SnO_2 ,
 - 30 - from 0.1% by weight to 0.5% by weight of F,
 - from 0.2% by weight to 1.0% by weight of CeO_2 .
14. A glass-ceramic as claimed in any of the preceding claims, wherein from about 5% to about 50%, preferably from about 5% to 35%, in particular from about 5% to about 20%, of crystals of the first group are present.
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15. A glass-ceramic as claimed in any of the preceding claims, wherein the crystals of the first group have particle sizes of $< 0.5 \mu\text{m}$, preferably $< 0.3 \mu\text{m}$.
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16. A glass-ceramic as claimed in any of the preceding claims, wherein the crystals of the second group have particle sizes of from $1 \mu\text{m}$ to $10 \mu\text{m}$, preferably from $1 \mu\text{m}$ to $7 \mu\text{m}$.
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17. A glass-ceramic as claimed in any of the preceding claims, wherein the crystals of the second group consist of more than 50%, preferably more than 80%, of crystals having particle sizes of from $1 \mu\text{m}$ to $7 \mu\text{m}$, and less than 50%, preferably less than 20%, of crystals having particle sizes of $> 7 \mu\text{m}$.
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18. A glass-ceramic as claimed in any of the preceding claims, which has the following particle size distribution of the leucite crystals in the glass phase:
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- from about 5% to about 50% of crystals of the first group,
 - 25 - up to about 1%, preferably up to about 0.5%, of crystals having particle sizes of $> 7 \mu\text{m}$, and
 - the balance, based on 100%, of crystals having particle sizes of from $1 \mu\text{m}$ to $7 \mu\text{m}$.
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19. A glass-ceramic as claimed in any of the preceding claims, wherein the crystal phase is essentially free of cracks.
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20. A glass-ceramic as claimed in any of the preceding claims which has a coefficient of thermal expansion (CTE at from 25°C to 500°C) of from 11 to $16.5 \times 10^{-6}/\text{K}$ and a firing temperature of from 700°C to 950°C .

21. A process for producing a glass-ceramic as claimed in any of the preceding claims, which comprises mixing the leucite crystals having the appropriate particle size distribution and glass particles with one another, and subjecting the resulting mixture to a heat treatment at temperatures in the range from 700°C to 1 100°C.
22. The process as claimed in claim 21, wherein the heat treatment is carried out at temperatures in the range from 850°C to 1 050°C, preferably at about 1 000°C.
23. The process as claimed in claim 21 or claim 22, wherein the heat treatment is carried out for from 10 minutes to 2 hours, preferably from 30 minutes to 1.5 hours, in particular about 1 hour.
24. The process as claimed in any of claims 21 to 23, wherein the leucite crystals are prepared as follows:
- weighing out stoichiometric amounts of the components for the leucite, preferably K_2O , Al_2O_3 and SiO_2 ,
 - melting the mixture obtained at temperatures of from 1 400°C to 1 600°C,
 - heat-treating the product obtained, preferably at a temperature of about 1 000°C for a period of 1 hour, and
 - comminuting the heat-treated product to the desired particle size distribution, preferably by means of at least one milling step.
25. The use of a glass-ceramic as claimed in any of claims 1 to 20 for dental purposes, in particular as dental material.

26. The use as claimed in claim 25 for facing tooth replacement, in particular for metal-ceramic tooth replacement.
- 5 27. A tooth replacement, in particular a metal-ceramic tooth replacement, which comprises a glass-ceramic as claimed in any of claims 1 to 20, in particular is coated or faced with such a glass-ceramic.